



Digital Economy and Society Index (DESI) 2021

Denmark

About the DESI

The European Commission has monitored Member States' progress on digital and published annual Digital Economy and Society Index (DESI) reports since 2014. Each year, the reports include country profiles, which help Member States identify areas for priority action, and thematic chapters providing an EU-level analysis in the key digital policy areas.

In 2021, the Commission adjusted DESI to reflect the two major policy initiatives that will have an impact on digital transformation in the EU over the coming years: the Recovery and Resilience Facility and the Digital Decade Compass.

To align DESI with the four cardinal points and the targets under the Digital Compass, to improve the methodology and take account of the latest technological and policy developments, the Commission made a number of changes to the 2021 edition of the DESI. The indicators are now structured around the four main areas in the Digital Compass, replacing the previous five-dimension structure. 11 of the DESI 2021 indicators measure targets set in the Digital Compass. In future, the DESI will be aligned even more closely with the Digital Compass to ensure that all targets are discussed in the reports.

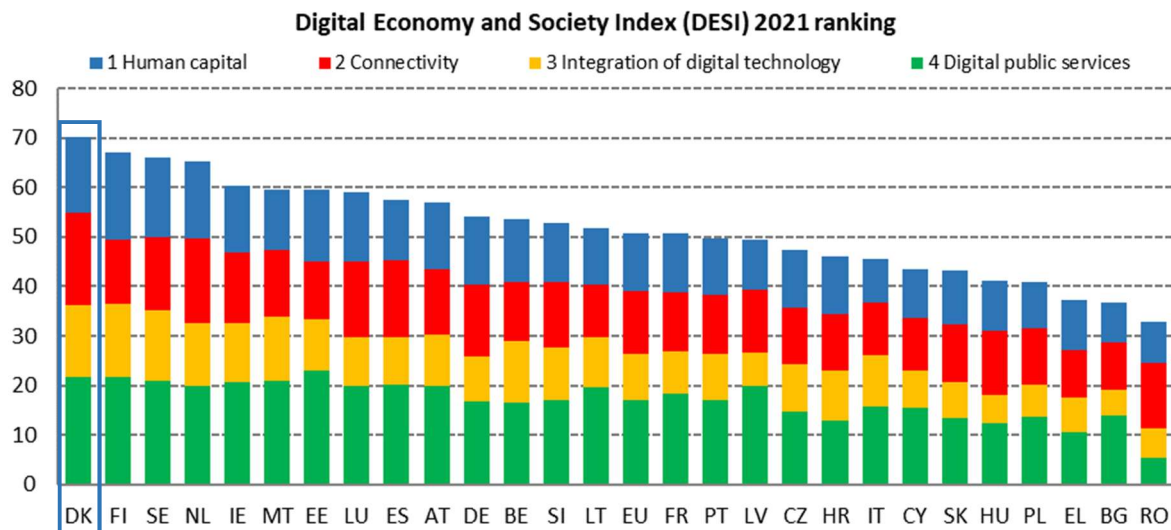
In addition, DESI now includes an indicator measuring the level of support that adopted ICT technologies provided companies in taking more environmentally-friendly measures (ICT for environmental sustainability) and the take up of gigabit services, plus the percentage of companies offering ICT training and using e-invoicing.

The DESI scores and rankings of previous years were re-calculated for all countries to reflect the changes in the choice of indicators and corrections made to the underlying data.

For further information, see the DESI website: <https://digital-strategy.ec.europa.eu/en/policies/desi>.

Overview

DESI 2021	Denmark		EU
	rank	score	score
DESI 2021	1	70.1	50.7



Denmark ranks 1st out of the 27 EU Member States in the European Commission's 2021 edition of the Digital Economy and Society Index (DESI). Denmark leads in Connectivity, ranks 2nd in Integration of digital technology and Digital public services and 4th in Human capital. Denmark has slightly improved its scores in all DESI dimensions, except for Connectivity which has improved significantly.

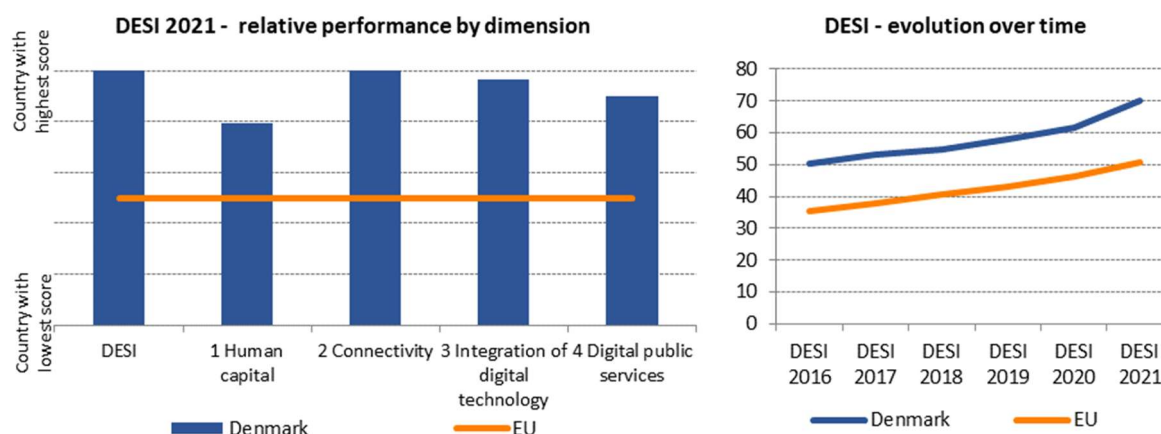
Danes have strong digital skills compared to other Europeans, but 30% of adults and 25% of the labour force still lack basic digital skills. The country's share of information and communications technology (ICT) specialists in the workforce and its share of ICT graduates are higher than the EU average. Nevertheless, 58% of Danish businesses trying to recruit ICT experts report hard-to-fill vacancies for jobs requiring ICT specialist skills (EU average 55%). Particular attention should be paid to the lack of ICT specialists (especially women) as it holds back the digitalisation of business.

Denmark ranks 1st in Connectivity. 94% of households are connected to very-high-capacity networks (VHCNs) and 70.1% to fibre. However, only 43% of households are subscribed to a broadband connection with at least 100 Mbps. 5G mobile-broadband coverage is one of the highest in the EU at 80% of populated areas. The country is committed to ensuring fast connectivity for all companies and the public and continues to make needed investment.

Most Danish enterprises are adopting digital technologies. 11.3% of Danish enterprises have very low levels of digital intensity, but there is a discrepancy between large enterprises (where only 2.7% have low levels of digital intensity) and SMEs (where 11.6% have low levels of digital intensity). More than half of Danish enterprises use e-invoices and cloud services, and a third use big data and social media. However, they lag behind in the use of artificial intelligence and ICT to make their business processes 'greener' and more environmentally friendly.

Denmark is also among the leaders in digital public services, with high levels of digital interaction by businesses and the public with all levels of government. The country has the highest rates of e-government use (92% of internet users) and the highest score of all Member States on open data. It is also making progress on green public procurement.

In the spring of 2021, the Danish government launched a Digitalisation partnership. This partnership consists of experts from the Danish business and research community, civil society, trade unions, municipalities, and regions. The partnership will make recommendations to the government on how Denmark should: (i) use the opportunities of digitalisation; and (ii) consider the connections between the digital transition, welfare, equality, growth, and employment. By the end of 2021, the Danish government will adopt a new Digital strategy based on the group's recommendations. It is important that the new strategy is ambitious to move Denmark up to the next level of digital development and for the country to continue to be a digital front-runner.



Digital in Denmark's Recovery and Resilience Plan (RRP)

The Danish RRP budget is EUR 1.6 billion. The RRP's main aim is to support investment in the green transition to reach the target of lowering greenhouse gas emissions in Denmark by 70% by 2030. The RRP therefore channels 59% of its funds to green initiatives. Nonetheless, Denmark will still invest 25% (EUR 382 million) of the RRP in digital measures.

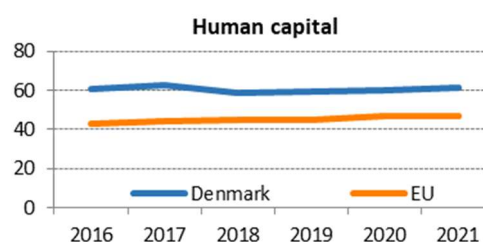
The largest share of the digital investments focuses on digitalising enterprises. Measures include tax deductions (EUR 232 million) for enterprises that purchase ICT equipment (e.g. robotics, 3D-printers and artificial intelligence) as well as grants to partly pay for advice, such as on how to develop enterprises' exports of electronic goods and services (EUR 9 million). A tax deduction is also planned for companies that invest in R&D in fields such as software, hardware, robotics and drone technology (EUR 59 million).

EUR 13 million is earmarked for improving broadband connectivity, and EUR 2 million is dedicated to new technologies and digital solutions in the health sector.

The main reform will be implementation of the forthcoming digital strategy (EUR 67 million), which will be adopted at the beginning of 2022. The expected level of ambition in the strategy is high. Denmark is determined to remain a digital leader in Europe. Four of the planned sub-reforms in the strategy will focus on further digitalising the public administration and preparing it for future challenges, including, inter alia, targets to increase public-private innovation partnerships, uptake of AI technologies in public sector and adopting a new cybersecurity strategy. The new strategy will also address the digitalisation of companies and the development of digital skills.

1 Human capital

1 Human capital	Denmark		EU
	rank	score	score
DESI 2021	4	61.2	47.1



	Denmark			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
1a1 At least basic digital skills	71%	70%	70%	56%
% individuals	2017	2019	2019	2019
1a2 Above basic digital skills	47%	49%	49%	31%
% individuals	2017	2019	2019	2019
1a3 At least basic software skills	72%	70%	70%	58%
% individuals	2017	2019	2019	2019
1b1 ICT specialists	5.1%	5.2%	5.5%	4.3%
% individuals in employment aged 15-74	2018	2019	2020	2020
1b2 Female ICT specialists	20%	21%	22%	19%
% ICT specialists	2018	2019	2020	2020
1b3 Enterprises providing ICT training	28%	31%	30%	20%
% enterprises	2018	2019	2020	2020
1b4 ICT graduates	4.8%	4.8%	4.9%	3.9%
% graduates	2017	2018	2019	2019

On human capital, Denmark ranks 4th out of 27 EU countries and is thus well above the EU average. 70% of the adult population has basic digital skills and 49% has above-basic digital skills – among the highest in the EU. Nevertheless, 25% of the workforce still lacks basic digital skills (EU average 36%). The proportion of ICT specialists in the workforce stands at 5.5% and only 22% of ICT specialists are female. The share of ICT graduates is stable compared to last years - one percentage point over the EU average. However, 58% of enterprises trying to recruit ICT experts report that it is hard to fill vacancies for jobs requiring ICT specialist skills (EU average 55%). Around a third of enterprises provide ICT training to their staff.

During the COVID-19 pandemic, all educational establishments were closed for 8 months to keep the spread of the virus under control. Schools could use established learning platforms. This meant a 200% increase in the use of online tools in education and an unprecedented load on the educational-network infrastructures supporting schools and higher education. To strengthen digital skills among teachers in higher education, the Ministry of Higher Education and Research allocated EUR 6 million in 2020 through nine projects¹.

The Danish technology pact, one of the initiatives included in the national growth plan, provides initiatives to improve skills in science, technology, engineering and mathematics (STEM). The Technology pact is a collaboration between the government, private companies, educational institutions, industry/trade organisations and trade unions. The pact funds a number of projects aimed at getting more women and girls interested in the STEM area, including IT. The pact also funded a

¹ <https://ufm.dk/aktuelt/pressemeldelser/2020/fremtidens-undervisere-skal-mestre-de-digitale-muligheder>

number of projects aimed at getting more students to enrol in IT education and mentoring support to help students to complete an IT education in 2020.

In the national recovery programme, the government allocated EUR 16.1 million to create more places on courses of study of which a significant portion will be allocated to STEM programmes including IT programmes². This comes on top of the extra EUR 13.7 million allocated to increasing study places on STEM courses in December 2019³. As a result, the intake in STEM education programmes increased by 9% (1 380 study places) at the 2020 summer intake compared to the previous year⁴.

In June 2020, the national parliament agreed on a reform of the employment system with a budget of EUR 45.3 million in 2020-2023. As part of this agreement, everyone in the labour force will be given access to digital training and education. This had previously been reserved for people working in companies in 2020 and 2021, but is now also open for people who are working independently or who are not part of a company.

In 2021, a new set of initiatives to strengthen the Digital strategy was agreed upon by the Danish central government, the regions, and the municipalities. The purpose of this new set of initiatives is to continue working on achieving the main goals of the Digital strategy throughout 2021⁵.

The Danish Digital Skills and Jobs Coalition is a multi-stakeholder partnership focused on tackling the digital-skills gap and promoting lifelong learning. Dansk IT is the organisation responsible for coordinating the Coalition's activities, initiatives, and projects on digital skills and careers in emerging technologies⁶.

Only 5 out of the more than 72 000 EU Code Week activities were organised in Denmark in 2020⁷.

The level of digital skills in Denmark is high compared to the EU. However, the workforce is in need of upskilling and reskilling and there is a lack of digital specialists. Moreover, 3 out of 10 adults still do not have basic digital skills. Denmark is expected to tackle the digital-skills gap and address the shortage of technology specialists, especially women, with actions in the forthcoming new Digitalisation strategy (scheduled for release in autumn 2021).

Human capital in Denmark's Recovery and Resilience Plan

The Danish RRP recognises the digital skills gaps and aims to tackle them as part of a new Digital strategy, due to be released in autumn 2021. An expert group that includes representatives from the private and public sectors is developing recommendations for the strategy.

Two potential sub-reforms in the strategy touch on digital skills. The Strategy for the digital professions and jobs of the future may include actions to get more people with IT skills into the workforce. The 'Framework for a Denmark fit for a digital future' may include measures on promoting both the teaching of digital skills in schools and digital skills for the public, businesses and public employees.

² <https://ufm.dk/aktuelt/pressemeddelelser/2020/rekordmange-er-optaget-pa-en-videregaende-uddannelse>

³ <https://ufm.dk/aktuelt/pressemeddelelser/2019/udsigt-til-oget-optag-pa-stem-uddannelser>

⁴ <https://ufm.dk/aktuelt/pressemeddelelser/2020/rekordmange-er-optaget-pa-en-videregaende-uddannelse>

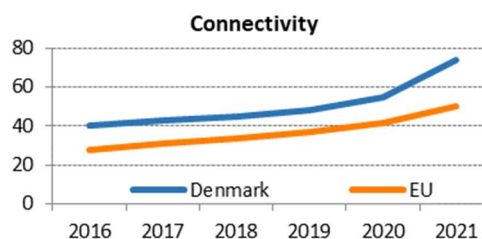
⁵ Kommunernes Landsforening.

⁶ <https://digital-skills-jobs.europa.eu/en/about/national-coalitions/denmark-national-digital-skills-and-jobs-coalition>

⁷ <https://digital-strategy.ec.europa.eu/en/news/eu-code-week-organisers-register-over-72000-activities-second-year-row>

2 Connectivity

2 Connectivity	Denmark		EU
	rank	score	score
DESI 2021	1	74.0	50.2



	DESI 2019	Denmark DESI 2020	DESI 2021	EU DESI 2021
2a1 Overall fixed broadband take-up % households	82% 2018	85% 2019	85% 2020	77% 2020
2a2 At least 100 Mbps fixed broadband take-up % households	28% 2018	34% 2019	43% 2020	34% 2020
2a3 At least 1 Gbps take-up % households	NA	1.26% 2019	4.38% 2020	1.3% 2020
2b1 Fast broadband (NGA) coverage % households	95% 2018	96% 2019	96% 2020	87% 2020
2b2 Fixed Very High Capacity Network (VHCN) coverage % households	64% 2018	93% 2019	94% 2020	59% 2020
2c1 4G coverage % populated areas	>99.9% 2018	>99.9% 2019	>99.9% 2020	99.7% 2020
2c2 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	33% 2019	33% 2020	99% 2021	51% 2021
2c3 5G coverage % populated areas	NA	NA	80% 2020	14% 2020
2c4 Mobile broadband take-up % individuals	84% 2018	87% 2019	87% 2019	71% 2019
2d1 Broadband price index Score (0-100)	NA	61 2019	60 2020	69 2020

In Connectivity Denmark ranks 1st out of all EU countries. There is excellent, fixed VHCN coverage of 94% of households, the third highest in the EU. Fibre coverage had reached 70.1 % overall and 70.9% of rural households by mid-2020. However, only 43% of households had taken up a broadband connection of at least 100 Mbps even though this is still above the EU average of 34%. On fixed-broadband take-up, 85% of all households subscribe to fixed internet access of some kind, slightly above the EU average of 77%. 4G coverage had already reached 100% of households in 2016, and Denmark has a joint-high coverage of 5G mobile and broadband at 80%.

In 2021, Denmark's digital focus will mainly be on how to ensure coverage with fast broadband to the remaining 4% of households and businesses that currently do not have it, and preparing Denmark for the internet services of the future, including by preparing for the roll-out of 5G.

Since 2016, the National Broadband Fund has provided State aid for the roll-out of VHCN in local communities, where there was no prospect of roll-out by the private providers in the market. Overall, the Fund's contribution has been modest compared to the massive roll-out by private-sector market players. However, the Fund has both offered grants to concrete community projects and generated new interest by broadband providers in offering local roll-out on market terms. This synergy between

the Fund and private-sector market operators has helped a number of underserved communities to get access to VHCN in recent years.

Local or regional (consumer-owned) utility companies have been rolling out fibre networks across the country, including in rural areas. From 2018 to 2019, total investments in the telecommunications sector increased by approximately 23%. Investments in fixed broadband rose by approximately 20%. As a result of an expected ambitious commercial roll-out of fixed broadband, a recent forecast estimates that 99% of all households and businesses will be covered with fixed VHCN broadband by 2025.

Fibre roll-out is progressing rapidly. The incumbent operator TDC is investing significantly in fibre roll-out. At the same time, the utility companies deploying fibre are also rushing to complete fibre roll-out in their regional areas.

In 2020, a number of these utility companies signed agreements with service providers opening their fibre networks to alternative operators. Three of the fibre networks – Norlys, Nord Energi and EWII – signed agreements that opened the networks up to between 4 and 6 service providers. A further three utility companies have concluded agreements that will give alternative operators access to their fibre networks from 2021.

Among others, the utility companies SEAS-NVE and NRGi have pledged to invest an additional EUR 619 million in 2019-2023 in fibre through their mutually owned broadband provider, Fibia. Norlys has pledged to cover all addresses in its supply area with high-speed fixed broadband before the end of 2023. Most of the addresses will be covered with fibre. In addition, a number of small (and in most cases local) providers of fixed wireless broadband are expanding their activities. These activities are typically in rural areas, where addresses are far apart. Some of the providers offer access to high-speed broadband with speeds of 100 Mbps or more.

Denmark now scores 99% in the 5G readiness indicator and ranks first on 5G mobile-broadband coverage (with 80% of households covered). The Danish Energy Agency is taking the necessary actions to ensure that enough spectrum is available in due time. The 700 MHz, 900 MHz and 2 300 MHz bands were auctioned in March 2019. All Danish operators (TDC, Hi3G and the Telia-Telenor joint venture TT-Netværket) were awarded spectrum in this auction, raising a total of EUR 296 million. The 700 MHz and 900 MHz licences entered into force in June 2020, while the 2 300 MHz band licences entered into force in April 2019. Thus, the new licence holders of 700 MHz were able to use the spectrum, complying with the deadline.

The final 5G auction was held at the beginning of 2021. The result of the auction, which raised EUR 279 million, was as follows:

- Hi3G won 40 MHz in the 2 100 MHz band, 120 MHz in the 3.5 GHz band and 1 000 MHz in the 26 GHz band;
- TDC Net won 45 MHz in the 1 500 MHz band, 40 MHz in the 2 100 MHz band, 40 MHz in the 2 300 MHz band, 130 MHz in the 3.5 GHz band and 1 250 MHz in the 26 GHz band;
- TT-Netværket won 45 MHz in the 1 500 MHz band, 40 MHz in the 2 100 MHz band, 140 MHz in the 3.5 GHz band (including 60 MHz with a leasing obligation), and 600 MHz in the 26 GHz band.

The winners must ensure a population coverage of 60% by the end of 2023 and 75% by the end of 2025 using the 3.5 GHz frequency band. Additionally, the winners must ensure mobile-talk and mobile-broadband coverage of at least 30 Mbit/s download speed and 3 Mbit/s upload speed in a third of 122 local areas where mobile coverage is lagging behind.

Mobile operators such as TDC and Telia have carried out 5G tests and demonstrations using 3.5 GHz. Denmark made it easier to get access to spectrum for trials by acquiring a 5G trial spectrum licence, which could be obtained for EUR 81 as long as the associated frequencies were not used for commercial purposes. It was also possible to get time-limited licences for 3.5 GHz, which could be used for the commercial roll-out of 5G until the permanent licences were issued in May 2021 as a result of the completed auction.

From the industry's perspective, the leading operator TDC has revealed that a national 5G network has already been rolled out using both 700 MHz and 3.5 GHz. Telenor, Telia and Hi3G have already activated several 5G sites using 3.5 GHz. One mobile operator has already made its 5G network available for commercial access in major urban centres.

Network deployment is expected to continue in order to reach uninterrupted 5G wireless broadband coverage in all urban areas as well as major roads and railways by 2025 (and thus meet the goals mentioned earlier of 60% population coverage with the 3.5 GHz band by the end of 2023 and 75% coverage with the 3.5 GHz band by the end of 2025). National 5G coverage is expected by at least one operator in 2021. Another operator has indicated that it will ensure national 5G coverage by 2022.

Main market & regulatory developments

Market shares in the fixed-broadband market have overall been stable, showing only minor changes in the last year. TDC continues to have the highest share, but its share decreased from 49.5% at the end of 2019 to 44.8% at the end of 2020.

Legislative amendments to the existing laws to transpose the European Electronic Communications Code were passed by the Danish Parliament in early December, with entry into force on 21 December 2020. The Danish government issued the necessary executive orders, which entered into force by 21 December 2020. An administrative error in the reporting of the completion of the transposition was corrected to the European Commission on 11 February 2021, but the Commission had already initiated infringement proceedings. The infringement was closed the 15 July 2021.

In 2020, the Danish Business Authority (DBA) completed decisions on the wholesale markets for terminating voice calls in the mobile networks of Telia, Telenor, TDC, Hi3G and Lycamobile (Market 2). At present, the DBA is now working on new reviews of markets and has concluded that the wholesale broadband market should be divided into two sub-markets: Market 3HC – wholesale broadband market for access to high-capacity infrastructure (fibre and coax); and Market 3LC – wholesale broadband market for access to low-capacity infrastructure (copper). Also, the market definition implies that there are 21 geographical segmented sub-markets on the high-capacity market. The DBA is also working on market decisions on the market for wholesale call termination on individual, public telephone networks provided at a fixed location (Market 1 from the 2014 recommendation).

Denmark has already implemented most of the recommendations from the European connectivity toolbox, and is currently considering further implementation measures in civil works, mast sharing, and duct sharing.

In 2020, Denmark's Telecommunications Complaints Board saw a 15% decrease in the overall number of complaints. The decline in complaints was especially visible in March-June and again in October. Although it is unclear why this was the case, there might be a connection to COVID-19 and uncertainty due to lockdowns, etc. Most of the complaints to the Complaints Board are over terms and conditions (about 30% of all complaints) and most of these complaints concern more than one service (bundled services).

Fixed-broadband and mobile-network coverage are significantly above the EU average. As Denmark overwhelmingly relies on private investments, decisions about regulated access to fibre networks resulting from the ongoing market reviews will be significant for investors.

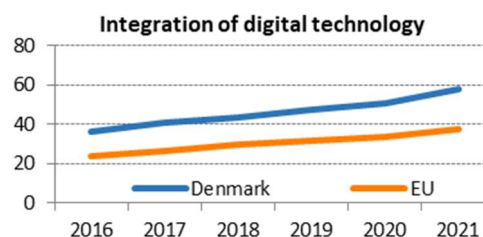
The 5G spectrum auctions were completed at the beginning of 2021 and the roll-out of 5G continues at a good pace with one operator already having announced national 5G coverage.

Connectivity in Denmark's Recovery and Resilience Plan

The Danish RRP estimates that 6% of households and/or companies (corresponding to 100,000 addresses), still do not have high-speed-internet access. The Broadband Pool – a government fund to increase access to broadband – will spend EUR 13 million to cover this gap through investments in very high-speed (minimum of 100 Mbps coverage) internet access for the public, households and companies in rural areas across the country. Further national funding will be added to ensure full coverage and to top up the requested recovery and resilience funding.

3 Integration of digital technology

3 Integration of digital technology	Denmark		EU
	rank	score	score
DESI 2021	2	57.9	37.6



	Denmark			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
3a1 SMEs with at least a basic level of digital intensity	NA	NA	88%	60%
% SMEs			2020	2020
3b1 Electronic information sharing	40%	50%	50%	36%
% enterprises	2017	2019	2019	2019
3b2 Social media	29%	32%	32%	23%
% enterprises	2017	2019	2019	2019
3b3 Big data	14%	14%	27%	14%
% enterprises	2018	2018	2020	2020
3b4 Cloud	41%	41%	57%	26%
% enterprises	2018	2018	2020	2020
3b5 AI	NA	NA	22%	25%
% enterprises			2020	2020
3b6 ICT for environmental sustainability	NA	NA	54%	66%
% enterprises having medium/high intensity of green action through ICT			2021	2021
3b7 e-Invoices	55%	55%	57%	32%
% enterprises	2018	2018	2020	2020
3c1 SMEs selling online	31%	33%	38%	17%
% SMEs	2018	2019	2020	2020
3c2 e-Commerce turnover	17%	18%	20%	12%
% SME turnover	2018	2019	2020	2020
3c3 Selling online cross-border	9%	10%	10%	8%
% SMEs	2017	2019	2019	2019

Danish enterprises have embraced digital technologies, with Denmark ranking 2nd among EU countries for the integration of digital technologies. 88% of Danish SMEs and 97% of large enterprises have at least a basic level of digital intensity. On average, 57% of enterprises use cloud services and e-invoices, exceeding the EU averages. 50% of enterprises use advanced software for at least one of their business operations (electronic information sharing), and one third of them use social media and big data – well above the EU average. Danish enterprises lag slightly behind in the adoption of artificial intelligence (22% in Denmark, against an EU average of 25%). Only 54% of Danish enterprises report that ICT has helped them to take environmentally friendly ‘green’ actions to a medium or high level, which is the lowest in the EU. More than twice as many SMEs sell online in Denmark than the EU average. 20% of all Danish SMEs’ turnover is the result of e-commerce. Only 10% of Danish SMEs sell cross-border (although this is still above the EU average of 8%).

The national SME:Digital⁸ programme is popular among Danish SMEs. This programme received additional public funds in 2020 to further promote the digital transition and e-commerce capabilities

⁸ <https://smvdigital.dk/>

of SMEs in 2021 and beyond. The programme has also extended its grant scheme to include subsidies to buy new hardware and software. More than 900 enterprises benefited from the programme in 2020.

The Virksomhedsguiden⁹ platform guides enterprises on how to start, operate and develop their enterprises. It has played a key role in informing Danish enterprises about restrictions and opportunities throughout the COVID-19 crisis.

The publicly funded business development centre, and 14 consolidated clusters covering all of Denmark, support the integration and adoption of advanced digital technologies. Three of these clusters are dedicated to digitalisation¹⁰, advanced manufacturing¹¹ and robotics¹². In addition, Denmark has proposed a consortium for the network of European Digital innovation hubs and is evaluating ways to integrate these hubs into national funding and structures.

In March 2019, the Danish government published a national strategy for artificial intelligence (AI)¹³. It aims at putting Denmark at the forefront of responsible development of AI. The strategy includes 24 initiatives for which EUR 9.2 million was reserved by the Danish government for the period 2019-2027. In 2020, local government developed a tool kit for people that wanted to start AI projects. Local government also organised AI workshops focusing on knowledge sharing and joint development of AI-enhanced tools for work collaboration. The EUR 9.2 million budget was reprioritised in 2021 and lowered to EUR 5 million, mainly due to new political priorities and unexpected budget restraints. The government plans to re-evaluate the AI strategy in order to determine future actions in AI.

In 2018, the strategy for national collaboration on digital research infrastructure laid the foundation for Denmark's development of high-performance computing (HPC). In 2020, a group coordinating electronic infrastructure for several Danish universities, DeIC¹⁴, announced its intention to set up four national HPC machines. The same year, DeIC invested EUR 3.8 million to achieve this goal, with financing from the Danish Ministry for Higher Education and Science and eight universities.

The Danish government has also earmarked funds for research into new models and tools to: (i) assess threats and bolster national digital infrastructure against cyber-attacks; and (ii) help improve the ability of authorities and enterprises to identify attackers. Five projects in cybersecurity and new technology have received funds of approximately EUR 2.22 million to conduct this research. The Danish Innovation Fund is also spending EUR 38.3 million on research into new technological opportunities including – among other subjects – IT security.

The Danish authorities continue to focus on: (i) ensuring the uptake and use of advanced digital technologies, and (ii) accelerating the digital transformation, especially in small enterprises to reduce the digitalisation gap between large and small enterprises.

⁹ <https://virksomhedsguiden.dk/erhvervsfremme/content/>

¹⁰ <https://digitallead.dk/english/>

¹¹ <https://en.made.dk/>

¹² <https://www.odenserobotics.dk/>

¹³ https://knowledge4policy.ec.europa.eu/ai-watch/denmark-ai-strategy-report_en

¹⁴ <https://www.deic.dk/en>

Integration of advanced technology in Denmark's Recovery and Resilience Plan

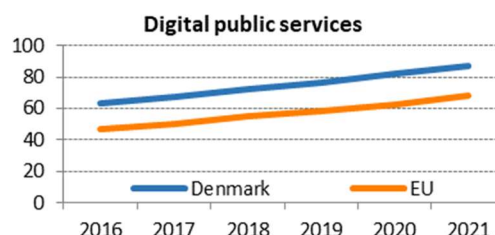
Around 78% (EUR 300 million) of the digital measures in the Danish RRP are dedicated to the digital transformation of business and digital related R&D in enterprise's.

Measures include tax deductions worth EUR 232 million for purchasing ICT equipment, e.g., robotics, 3D printers and AI. The intention is to encourage green investments in advanced and innovative digital technologies, excluding fossil-fuel driven machinery. The RRP also addresses the integration of technology in SMEs by giving national subsidies worth EUR 9 million to: (i) build up SMEs' digital capacities; (ii) support widespread use of advanced ICT; and (iii) promote export activities.

Moreover, tax deductions worth EUR 59 million will be given to companies to boost research and development in interdisciplinary digital fields of software, hardware, robotics, and drone technology.

4 Digital public services

4 Digital public services	Denmark		EU
	rank	score	score
DESI 2021	2	87.1	68.1



	DESI 2019	Denmark		EU
		DESI 2020	DESI 2021	DESI 2021
4a1 e-Government users	94%	94%	92%	64%
% internet users	2018	2019	2020	2020
4a2 Pre-filled forms	NA	NA	84	63
Score (0 to 100)			2020	2020
4a3 Digital public services for citizens	NA	NA	84	75
Score (0 to 100)			2020	2020
4a4 Digital public services for businesses	NA	NA	96	84
Score (0 to 100)			2020	2020
4a5 Open data	NA	NA	96%	78%
% maximum score			2020	2020

Denmark ranks 2nd in the EU in Digital public services. The country has the most e-government users in the EU (92% of internet users use e-government) and Denmark scores well above the EU average in all indicators under this dimension. On digital public services for citizens, the country ranks 10th, indicating there is still potential for improvement. On open data, Denmark has the highest score of all Member States.

Denmark launched several new successful initiatives in 2020 and 2021 to ensure that more public services are digitalised, user-friendly and accessible to all citizens and companies. Denmark is committed to continuing this effort of raising awareness among the public, businesses and authorities of the digital service offering. It is also committed to helping people not yet familiar with digital services to begin using them.

The Danish government has recently created a Digitalisation partnership. The participants in the partnership include CEOs and experts from business, industry, research, civil society, and trade unions. The aim of the partnership is to make recommendations on how Denmark can advance on the digital agenda in four keyways: (i) better service and a more efficient public sector; (ii) strengthening businesses through digital transformation; (iii) digital green initiatives; and (iv) ensuring a fair and equal society that is ever more digital.

The recommendations from this Digitalisation partnership will be included in the preparations for a new Digital strategy that will be published by the end of 2021. The new strategy will set out more ambitious goals for: (i) developing and improving digital welfare solutions for the benefit of businesses and the public; (ii) the effective use of data and new technologies in the fight against climate change; and (iii) the creation of better conditions for a more innovative and interconnected public sector.

From August 2021, Denmark will launch a new electronic identification (eID) tool called MitID ('my-ID'). The new tool has been developed to make the Danish eID infrastructure more future proof, secure and flexible. The system has been developed as a public-private partnership between the

Danish Agency for Digitalisation and Finance Denmark, the Danish bank association. Denmark has also worked to continue to ensure cross-border access to the Danish eID infrastructure. The national eIDAS node¹⁵ for the current national eID system (NemID) has been operational since June 2018. There are currently over 70 services from public authorities connected to the node, and more are expected in the future¹⁶. Work is continuing providing solutions for identity matching to allow cross-border users to use Danish public e-services with the help of the eIDAS node. Work is also progressing on supporting the national implementation of the single digital gateway.

Since November 2020, Danes have been able to download their driving licence in digital form via an app and leave their physical driving licence at home. The new driving licence was quickly adopted: there were more than 500,000 downloads in the 24 hours after release and it has now been downloaded over a million times. Additionally, in June 2021, Denmark launched a digital app-version of the Danish health-insurance card. Within the first month, the app was downloaded more than 1 million times.

During 2020, there was an increased focus on enabling non-digitally literate and semi-digitally literate Danes to access local and national digital infrastructure. Non-digitally literate people have access to help and guidance at their local Citizen Service Centre. In parallel, non-digital services are also available at these centres, to complement the digital services, ensuring accessibility and thus facilitating more inclusive public services.

Since 2018, operators in the Danish healthcare sector have joined forces and coordinated actions to better predict, prevent, detect and respond to cybersecurity and information-security incidents. A decentralised cyber and information security unit was set up in 2018 by the Danish Health Data Authority¹⁷ to coordinate the work.

Using ICT to deliver welfare services has for many years been a strategic focus in Denmark. This was reaffirmed in 2021 in the 'Digital health strategy 2018-2022'¹⁸. Denmark's nationwide implementation of tele-health relies on a well-developed national infrastructure based on international standards that facilitates data sharing and integration across the healthcare system.

In March 2021, the Danish Government and Danish regions updated the National strategy for personalised medicine. The focus of the strategy is to ensure coordination and direction to develop better and more targeted healthcare for patients, by using new technologies and knowledge. The overall aim is to establish a common, nationwide and more secure technological infrastructure for performing whole-genome sequencing and using genetic information in healthcare and research. The national budget (EUR 4 million a year) funds the National Genome Centre. The Novo Nordisk Foundation provided EUR 46.6 million for the establishment and operation of the National Genome Centre's infrastructure and to sequence the whole genome of 60,000 patients from 2020 to 2024.

Since April 2021¹⁹, the new Danish life-science strategy includes an initiative to explore the potential for establishing a common, national analysis platform for so-called secondary use of health data. The aim is to help data users to access health data and other relevant data from different data controllers in a secure analysis environment with extensive storage and computing capacity (supercomputer facilities).

15 Each Member State sets up a node i.e. an interface which communicates with other nodes to request or provide cross-border identification and authentication

16 Danish Agency for Digitalisation

17 <https://sundhedsdatastyrelsen.dk/da/english>

18 <https://sundhedsdatastyrelsen.dk/da/diverse/download>

19 <https://sum.dk/nyheder/2021/april/ny-strategi-skal-loefte-dansk-life-science-op-i-verdensklasse-og-sikre-enda-betere-patientbehandling>

The current Danish National strategy for cyber and information security (2018-2021) covers: (i) technological resilience to secure better protection of critical government IT systems; (ii) knowledge and skills among the public, universities, enterprises and authorities'; and (iii) national coordination and cooperation on information security. During 2021, the Danish government expects to launch a new national cyber security strategy with a continued focus on strengthening cyber security resilience in the Danish digital infrastructure.

Highlight 2020-2021: Digital-ready legislation

Denmark's public digital infrastructure and focus on developing 'digital-ready' legislation has shown its worth during the COVID-19 pandemic.

Denmark's focus on digital-ready legislation originates from a unanimous parliament decision in 2018. The decision aimed at simplifying legislation to promote automated digital processing of legal cases before the courts. Following the decision, the Danish Agency for Digitisation has worked to simplify unnecessary and complex legislation and ensure that new legislation is more easily understandable and digitally compatible. This will enable quick and seamless implementation of any new legislation.

One example of the benefits of digital-ready legislation was the way the central government of Denmark was able to process COVID-19 stimulus cheques for 2 million benefit recipients fully automatically in less than 8 days in the autumn of 2020.

At this point, more than 270 bills have been analysed by the Danish Agency for Digitisation's secretariat for digital-ready legislation before they were presented in the parliament. A course in digital-ready policymaking will be made available to legislative drafters and policy officers in government departments by the summer of 2021. These efforts will help to ensure that Denmark will continue to reap the benefits of digital public administration.

Digital public services in Denmark's Recovery and Resilience Plan

As part of its RRP, Denmark has sought to make its healthcare system more resilient by focusing on data management and digitalised patient treatments, such as tele-medicine, electronic patient records, and digital management systems (EUR 2 million is earmarked for spending in this area).

Denmark also intends to continue to develop its digital public administration, as part of the digitalisation strategy that will be adopted at the beginning of 2022.